

THE INTERLINKING OF ECONOMIC BRANCHES IN THE EUROPEAN UNION

Consolidated Input-Output Table for 1991

The Input-Output Table can be considered especially suitable for isolating the structural problems in the European Union as well as the current business difficulties. Eurostat is therefore presenting a recently prepared table for the entire Union relating to 1991. This is a projection of the harmonized national tables for 1985, based on the Eurostat statistics currently available for the aggregates and branches.

The basic information given in the Input-Output Table

This table renders the interlinking of individual economic branches in the European Union transparent. In addition, it contains information on final demand and primary inputs. The IOTs refer to a period which lies some way back, the reason for this being the considerable complexity and amount of work involved in producing them. As structures change comparatively slowly, the interlinking shown here may be considered to be quite close to the current structure of the Union's economy.

Table 1 shows the economic interlinking of 25 branches running from agriculture, forestry and fisheries (number 1) to non-market services, (number 25). The interlinking with respect to **intermediate consumption** can be read off in the columns (resources) and rows (uses). For each branch, the corresponding column gives the cost structure and the row the sales structure. This makes it simple to determine the scale of intermediate consumption and primary inputs, together with the intermediate and final demand.

Taking the chemical industry as an example, the following explains how the position of each branch can be determined in the overall economy. Column 5 shows that the chemical industry received intermediate products amounting to ECU 963 million from agriculture, forestry and fisheries (row 1), for ECU 31.7 thousand million from the energy branch (row 2) and for example around ECU 95 thousand million from itself (column 5, row 5).

Table 1: Input-Output-Table of the European Union 1991, in Mio. ECU (part 1)

		Agricult.	Fuel and	Ferrous	Non-	Chemical	Metal	Agricultu	Office	Electrical	Transport	Food	Textile	Paper	Rubber	Other	Building	Recovery	Lodging
		forestry	power	and non-	metallic	products	products	ral and	machines	goods	equip	bever.	clothing	and	and	manu	civil engi	repair	catering
No	Branch	fishery		ferrous	mineral			industrial			ment	tobacco	leather	printing	plastic	facturing	neering	wholesale	services
		products		ore&met.	products			machin.					footwear	products	products	products	works	retail trade	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Agriculture, forestry and fishery products	45771	91	25	114	963	27	30	12	36	57	156632	3355	1328	781	4642	159	615	8733
2	Fuel and power products	13866	134851	22823	12965	31731	6039	3941	803	3109	5217	12024	5533	6079	3690	3183	11062	27336	9090
3	Ferrous and non-ferrous ores and metals	239	2139	83726	1949	2373	35244	13720	1518	11719	13329	590	91	404	1000	3986	13655	1024	38
4	Non-metallic mineral products	1175	529	2965	19325	5425	1831	572	381	2287	2946	4298	115	496	640	1423	71144	1252	1659
5	Chemical products	17617	3306	4425	4302	94987	3964	2058	779	4150	4587	4262	13235	7020	25056	3767	7935	3430	1619
6	Metal products	1399	3320	2604	1277	4289	20362	25165	1983	10061	25615	6323	1374	685	1561	3611	21713	5118	918
7	Agricultural and industrial machinery	3217	6236	1851	1923	1902	3922	33279	1009	3127	8257	1646	1357	998	785	689	8317	3176	169
8	Office machines, etc.	23	203	87	58	257	302	1119	5206	772	1037	141	57	260	65	58	378	1107	107
9	Electrical goods	279	3386	1468	494	833	2577	10548	5168	27459	13818	463	254	723	403	1138	12452	5814	297
10	Transport equipment	708	806	164	228	169	257	1277	27	185	49245	133	30	44	285	154	287	15626	67
11	Food, beverages, tobacco	36251	114	127	53	4881	46	69	15	81	100	82007	3880	515	34	101	119	2342	47430
12	Textile and clothing, leather, footwear	663	158	126	245	605	495	252	200	299	2532	310	59737	682	1493	2326	1556	3718	1203
13	Paper and printing products	596	845	639	2849	7417	1938	2039	2558	2958	1809	12158	2302	61585	1995	1869	1938	18038	1758
14	Rubber and plastic products	1208	1025	368	1169	6127	2936	4209	1776	9539	15031	5988	4619	1897	8576	4355	7331	6475	379
15	Other manufacturing products	500	305	386	871	470	966	880	242	1096	1221	1039	586	739	295	20944	16575	3216	436
16	Building and civil engineering works	1576	5416	695	698	746	691	631	422	427	894	1025	549	573	315	441	37682	6114	2631
17	Recovery, repair services, wholes., retail trade	16443	8550	20571	7775	13658	13100	12088	3421	10902	16297	26151	13732	9826	5119	7982	24386	19019	15416
18	Lodging and catering services	186	952	564	688	1434	1078	1870	375	1487	969	1005	1078	803	485	661	1729	7855	1037
19	Inland transport services	3080	4235	5864	5817	6616	4177	3339	819	2912	3904	9180	2937	3295	1599	2303	12832	21648	2610
20	Maritime and air transport services	285	2163	1245	415	1176	454	564	294	581	471	804	310	508	205	299	716	2695	211
21	Auxilliary transport services	1189	2751	1647	2200	1956	1215	1271	313	907	987	3296	784	3197	276	829	1582	8480	1193
22	Communications	503	1346	802	684	2347	1650	2010	715	1414	1408	1476	1417	2188	611	982	2850	13533	2830
23	Credit and insurance	1978	1507	848	837	2028	1432	1563	469	1280	1452	2095	1733	1350	780	1143	5585	9984	1542
24	Other market services	6705	24338	6787	9652	27509	14229	21136	10411	19324	24748	27991	12978	14258	7824	8263	56969	103392	15320
25	Non-market services	904	1039	484	276	1635	528	975	275	606	969	1259	290	512	362	178	2071	2953	977
26	DOMESTIC INTERMEDIATES	156363	209611	161295	76866	221535	119459	144604	39189	116719	196898	362297	132334	119964	64234	75324	321023	293960	117669
27	IMPORTED INTERMEDIATES	8874	126732	24775	5795	29040	12821	14935	7242	16216	20695	35763	18257	15660	7905	10080	16892	14618	5660
28	TOTAL INTERMEDIATES	165237	336343	186070	82660	250575	132280	159540	46431	132934	217593	398060	150591	135624	72139	85404	337915	308577	123330
29	Gross wages and salaries	29499	48704	25591	31275	52430	59660	71799	14786	69422	76397	55173	42066	48573	27260	28859	153253	259162	47996
30	Employers' social contribution	2959	10119	4596	5693	8173	8706	7939	2018	8667	11488	9952	8424	7129	4088	4840	24468	39459	7427
31	Gross operating surplus	108177	111173	12424	22210	40404	26324	24483	11165	28815	21888	58152	29053	29733	15294	18228	120727	325002	79249
32	GROSS VALUE ADDED, FACTOR COST	140635	169996	42611	59178	101008	94691	104222	27969	106903	109773	123277	79544	85434	46642	51927	298448	623623	134672
33	Net taxes production	-7252	63108	-401	1780	3386	2165	2065	900	3850	5676	34026	3836	2053	1458	2771	5747	22217	4317
34	GROSS VALUE ADDED, MARKET PRICES	133384	233105	42210	60959	104394	96855	106287	28869	110753	115449	157303	83380	87487	48100	54698	304195	645840	138989
35	VAT intermediate consumption	832	259	29	91	239	240	56	37	56	326	503	57	65	26	53	488	1129	927
36	ACTUAL OUTPUT	299453	569706	228309	143710	355208	229376	265883	75338	243743	333369	555867	234027	223176	120265	140156	642598	955546	263245
37	TOTAL TRANSFERS	-9254	896	-2102	162	192	-15	1053	-2589	-2542	-3205	7938	967	241	-1573	909	3236	-406	4461
38	DISTRIBUTED OUTPUT	290199	570602	226207	143872	355399	229361	266937	72749	241201	330164	563805	234994	223417	118692	141065	645834	955141	267706

At producers' prices (net of all VAT)

Table 1: Input-Output-Table of the European Union 1991, in Mio. ECU (part 2)

		Inland	Maritime	Auxiliary	Commun	Credit	Other	Non-	TOTAL	Final	Collective	Collective	FINAL	Gross	Changes	Exports	FINAL	TOTAL
		transport	and air	transport	cations	and	market	market	INTER	consump	consump	consump	CONSUMPTION	fixed	in	of goods	USES	USES
No	Branch	services	transport	services		insurance	services	services	MEDIATE	tion house	ion govern	ion privat	TION	capital	stocks	and		
		services	services							holds	ment	non-profit		formation		services		
		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
1	Agriculture, forestry and fishery products	27	72	29	7	50	2998	2798	229351	54261	58	2	54321	693	1433	4400	60848	290199
2	Fuel and power products	24676	10354	1830	1695	1809	16685	23693	394084	173426	0	0	173426	884	-3433	5642	176518	570602
3	Ferrous and non-ferrous ores and metals	564	42	93	88	6	270	437	188243	239	0	0	239	810	240	36674	37964	226207
4	Non-metallic mineral products	175	55	47	58	9	1128	1808	121743	7518	0	0	7518	1703	143	12766	22130	143872
5	Chemical products	394	172	198	74	322	9817	20602	238078	49628	0	0	49628	110	3949	63635	117321	355399
6	Metal products	589	185	358	94	250	2152	5104	146111	11170	0	0	11170	50144	-1796	23731	83249	229361
7	Agricultural and industrial machinery	551	80	234	185	111	1206	7751	91980	1770	0	0	1770	99088	-1072	75171	174956	266937
8	Office machines, etc.	75	67	49	117	256	4538	4717	21055	7664	0	0	7664	28118	-1675	17586	51693	72749
9	Electrical goods	757	162	287	1912	718	4284	9675	105368	31284	0	0	31284	63081	-1020	42488	135834	241201
10	Transport equipment	4834	3750	191	158	17	1097	25325	105063	76353	0	0	76353	65518	1693	81536	225101	330164
11	Food, beverages, tobacco	152	917	157	6	116	4196	11185	194892	353365	0	0	353365	197	3903	11447	368912	563805
12	Textile and clothing, leather, footwear	256	165	102	232	97	2281	2853	82587	116418	0	0	116418	943	1479	33567	152407	234994
13	Paper and printing products	1376	641	1199	1012	4783	25206	14017	173525	37087	0	0	37087	106	719	11981	49892	223417
14	Rubber and plastic products	3314	274	288	199	104	1913	2074	91176	13165	0	0	13165	1360	1167	11824	27516	118692
15	Other manufacturing products	345	83	95	146	366	2872	4997	59670	49760	79	3	49842	15878	100	15575	81395	141065
16	Building and civil engineering works	2055	273	1113	2045	3434	31813	31135	133392	16345	0	256	16601	490484	1986	3371	512441	645834
17	Recovery, repair services, wholes., retail trade	12971	1751	1893	2571	1866	15100	13939	294528	553373	0	0	553373	31983	-2821	78078	660613	955141
18	Lodging and catering services	1539	1025	2529	283	1722	7994	5483	44832	223468	0	0	223468	6	1	-601	222874	267706
19	Inland transport services	3125	710	2584	1390	843	3530	6544	115894	57868	0	0	57868	4963	-346	21677	84162	200056
20	Maritime and air transport services	288	5020	757	587	612	2474	1905	25041	11784	0	0	11784	1226	-539	52276	64747	89788
21	Auxilliary transport services	10552	10425	5772	217	531	2607	1283	65458	10271	5	0	10276	65	11	10868	21220	86678
22	Communications	1395	829	1146	2223	7070	12193	13344	76968	44164	0	0	44164	37	0	3073	47274	124242
23	Credit and insurance	3467	1078	1028	229	155101	11640	3151	213301	51847	0	0	51847	8	-4	4580	56431	269732
24	Other market services	8668	4814	5100	4420	55355	110120	104117	704428	626348	1772	149	628269	60167	-101	51392	739726	1444154
25	Non-market services	873	195	181	141	705	12066	39533	69986	97780	876532	50984	1025297	419	36	741	1026492	1096478
26	DOMESTIC INTERMEDIATES	83018	43139	27260	20087	236251	290183	357470	3986754	2676357	878446	51394	3606197	917991	4051	673477	5201716	9188470
27	IMPORTED INTERMEDIATES	5543	17588	1295	2440	3551	11753	19750	453880	124326	0	0	124326	52713	-687	32456	208808	662688
28	TOTAL INTERMEDIATES	88561	60727	28555	22527	239802	301936	377220	4440634	2800683	878446	51394	3730523	970704	3363	705933	5410524	9851158
29	Gross wages and salaries	71028	16445	25712	48438	72684	286445	541694	2204352	0	0	0	0	0	0	0	0	2204352
30	Employers' social contribution	14412	2326	4067	7698	15076	40571	94168	354463	0	0	0	0	0	0	0	0	354463
31	Gross operating surplus	62564	10150	28274	43583	-76791	739259	74141	1963683	0	0	0	0	0	0	0	0	1963683
32	GROSS VALUE ADDED, FACTOR COST	148004	28921	58052	99719	10970	1066275	710002	4522498	0	0	0	0	0	0	0	0	4522498
33	Net taxes production	-37913	-312	-463	282	12170	33561	5337	164363	0	0	0	0	0	0	0	0	164363
34	GROSS VALUE ADDED, MARKET PRICES	110092	28608	57589	100001	23139	1099836	715339	4686861	0	0	0	0	0	0	0	0	4686861
35	VAT intermediate consumption	1351	493	108	1918	6887	12306	32499	60975	230200	0	135	230335	59047	529	0	289911	350068
36	ACTUAL OUTPUT	200004	89828	86252	124446	269828	1414078	1125059	9188470	3030883	878446	51529	3960858	1029751	3892	705933	5700435	
37	TOTAL TRANSFERS	52	-40	426	-204	-96	30075	-28581	0	0	0	0	0	0	0	0	0	
38	DISTRIBUTED OUTPUT	200056	89788	86678	124242	269732	1444154	1096478	9188470	3030883	878446	51529	3960858	1029751	3892	705933	5700435	

At producers' prices (net of all VAT)

Rows 29 to 38 give the **uses components of value added**. Taking the chemical industry as an example again, wages and salaries account for around ECU 52 thousand million (row 29), ECU 8 thousand million for social contributions paid by the employers (row 30) and a gross operating surplus of ECU 40 thousand million (row 31).

Deducting subsidies linked to production gives a net tax burden of ECU 3.3 thousand million for this industry at the production stage (row 33). Gross value added at market prices for the branches (row 34) must be supplemented by non-deductible value-added tax on inputs (row 35) as the entire table is based on producer prices (i.e. without VAT on intermediate items with tax prepayment).

The resulting amount of value added elements plus the domestic and imported intermediates (rows 26 and 27) gives the actual production by branches (row 36); in the chemical industry, this was ECU 355 thousand million in 1991. Correcting for by-products and ancillary sales finally gives the adjusted distributed output by branch (row 38).

Whereas the values in rows 1-26 and the first 26 columns refer to the interlinking of production activities, the **final demand** for goods and services is shown in columns 27 to 34. Taking the chemical industry as an example, the final use of production is ECU 49628 million for private consumption (column 27) and ECU 63635 million for export outside the Union (column 33).

The sum of intermediate uses (column 26) and final demand (column 34) gives the total use by branches (column 35), which is around ECU 355 thousand million for the industry selected.

These brief explanations should show clearly that the basic structure of the IOT supplies not only extended branch statistics, but also gives additional information as far as the interlinking of branches is concerned. The example shows that this information can be read off with ease.

A considerable amount of such interlinking information is immediately visible and a number of indicators can be easily calculated by the user as the compact matrix representation allows a high information density.

A few examples of IOT indicators

Wage and salary share in value added

The percentage of wages and salaries in gross value added lies between 20% for energy products and 76% for non-market services, with an average quota of 47% for all branches taken together.¹

Fairly high wage and salary shares result for transport equipment and engineering at 66% and 68% respectively. A similar degree of wage intensity is only found in the iron and steel industry (61%), metal products (62%), electrical goods (63%) and inland transport services at around 65%.

Comparatively low wage and salary shares are seen for agriculture, forestry and fisheries (22%), non-identified market services (26%), food, beverages and tobacco, and lodging and catering with around 35% each.

¹ For the credit and insurance branch, the recording of imputed charges as intermediate consumption in the first quarter of the table has an effect on the use components. This special accounting rule in the ESA makes the indicators for this branch difficult to interpret and they are, therefore, mostly omitted in the following analysis.

Tax burden at the production stage

For all branches together, the taxes deducted at the production stage amount to around 3.5% of gross value added. The reason for this seemingly low value is that the more influential types of tax are levied at other points in the economic cycle such as the income and consumption stages.

The excise duties, on the other hand, are collected from the producers of the products in question. This explains the fairly high net tax shares for the energy branch amounting to about 27% via the mineral oil tax, and in the food and drink industry (22%) via taxes on tobacco and particularly on alcoholic beverages.

If the net tax share at the production stage is compared with the other especially significant branches which are not subject to excise duties, there are still considerable differences. For example, net tax load in the transport equipment industry is around 4.9% of gross value added at the production stage, or half as much again as in the chemical industry (3.2%) and the office machinery branch (3.1%). On the other hand, the rates in the metal and construction industries are comparatively small at 2.2% and 1.9% respectively.

Whereas general services at 3.1% are close to the average of all branches, the net tax rate for non-market services is 0.7% and for communications services as low as 0.3%.

In addition, there is a whole series of branches in which subsidies even exceed taxes at the production stage. This applies for example to domestic transport services with a net tax rate of -34% and agriculture, forestry and fisheries (-5.4%).

A negative net tax burden at the production stage applies also to the iron and steel industry (-1%), maritime and air transport (-1.1%) and auxiliary transport services (-0.8%) since subsidies exceed taxes paid.

Import ratios for intermediate consumption

There are also considerable differences, depending on branch, for the structure of internal intermediates and items imported from outside the Union (rows 26 and 27). The shares of items in the Union compared with intermediate consumption items as a whole varies between 62% in the energy branch to 98.5% in the credit and insurance sector, the average for the entire economy lying around 90%.

Far above average import ratios are accounted for by energy products, maritime and air transport services and the office machinery and computer branch, the latter two taking only 71% and 84.4% respectively of intermediate consumption items from the Union.

The branches with a share of more than 95% within the Union, or put differently, with an import share less than 5%, are building and civil engineering, recovery, repair, wholesale and retail trade, auxiliary transport services and non-market services.

As regards the major industrial branches, electrical goods account for 87.8% of intermediates obtained from the Union, the chemical industry 88.4%, the metal industry 90.3%, transport equipment 90.5% and machinery 90.6%. The proportion for agriculture, forestry and fisheries at 94.6% shows that the import from countries outside the Union is fairly low at 5.4%.

Exports from the Union as an example of final demand

The goods and services shown in column 33 leave the European Union, i.e. they are exports from the Common Market. 12.1% of the total exports are accounted for by transport equipment, 11.6% by recovery, repair, wholesale and retail trade and 11.2% by machinery. These three branches together account for more than one third of the Union's total export.

If the chemical industry is included with its share of 9.4% and maritime and air transport with 7.8%, more than half the Union exports have been covered.

If **export intensity** (exports from the Common Market) is measured in relation to total output (row 38), values emerge which are close to 0% (non-market services, hotels and catering but also building and civil engineering) up to 58.2% in the case of maritime and air transport services. More than one fifth of the output of a branch is exported in machinery (28.2%), office and data processing machines (24.2%) and transport equipment (24.7%).

Around a sixth of production is exported outside the Union by the chemical industry (17.9%), electrical goods (17.6%), and the iron and steel industry (16.2%). The metal industry as well as the rubber and plastics industry have shares of around 10% and the leather and textile branch account for 14.3%.

Determining the effects of change of production by means of the IOT

Apart from the number of simple parameters, only a few of which are referred to here, more complex information can be derived from the IOT. Particularly useful items include the **forward and backward effects of a decrease/increase in the production of one branch on the other branches**. These backward and forward linkages can be determined from the table and a distinction can be made between direct and indirect effects.

As the IOT is a static concept - a kind of snapshot of the structure of the Union economy in 1991 - the effects are only a rough pointer to the influences to be expected after current output variations. On the other hand, economic structures change quite slowly, particularly when such large economic areas as the Union are considered. All in all the linkage effects of 1991 should, therefore, still be largely reliable.

Once again, the effects of increased production in one key industry will serve for illustration purposes,

the industry being that of transport equipment. Even a quick look at the IOT shows that on the input side (column 10), the linkages with the following branches are particularly intensive: iron and steel, electrical goods, rubber and plastics, recovery, repair, wholesale and retail trade, other market services.

The standardized tool for representing such linkages is the "input coefficient" which is calculated from the share of the column value in total output. For example, for the intermediate consumption flow from the metal industry to transport equipment, the coefficient is 0.077, i.e. 7.7% of the entire input of the vehicle industry is accounted for by deliveries from the metal industry.

If vehicle production is to be increased, the **direct effects on the upstream branches** can be determined. This backward linkage effect amounts to 0.6 in this industry. In other words, a rise in production amounting to ECU 1 000 million generates a direct increase in the production of the industries providing the intermediate goods of ECU 600 million.

As, however, the ancillary branches obtain in turn intermediate consumption items from other branches, the indirect effects must be added to the direct. Taken overall, the coefficient for these two effects together is 2.15, or an increase of ECU 2.15 thousand million in the chosen example. Similarly, for all branches, coefficients can be determined for the **direct and indirect effects of an increase in production on the branches providing intermediates**.

Similar effects can be seen on the downstream linkages, i.e. on the output side. For transport equipment, these are seen in detail in row 10. The intensity of the linkage of the other branches is determined by output coefficients which are calculated by the shares of the row values for transport equipment (row 10) on the overall use of production (column 35). As may be expected, the coefficients for the branches recovery, repair, wholesale and retail trade are extremely high 0.047 (4.7%) as are those for non-market services 0.077 (7.7%).

The figure for the upstream effects on the output side in transport equipment amounts to ECU 318 million if vehicle production rises by ECU 1 000 million, as the coefficient is 0.318. On the output side too, there are indirect effects as well as direct ones; for the **direct and indirect forward linkages** for transport equipment, there is a coefficient of

1.46 and thus an overall effect of ECU 1.46 thousand million in the chosen example.

Having explained the basic concept the **effects for all the branches** by means of the values given in Table 2 can be compared.

Table 2


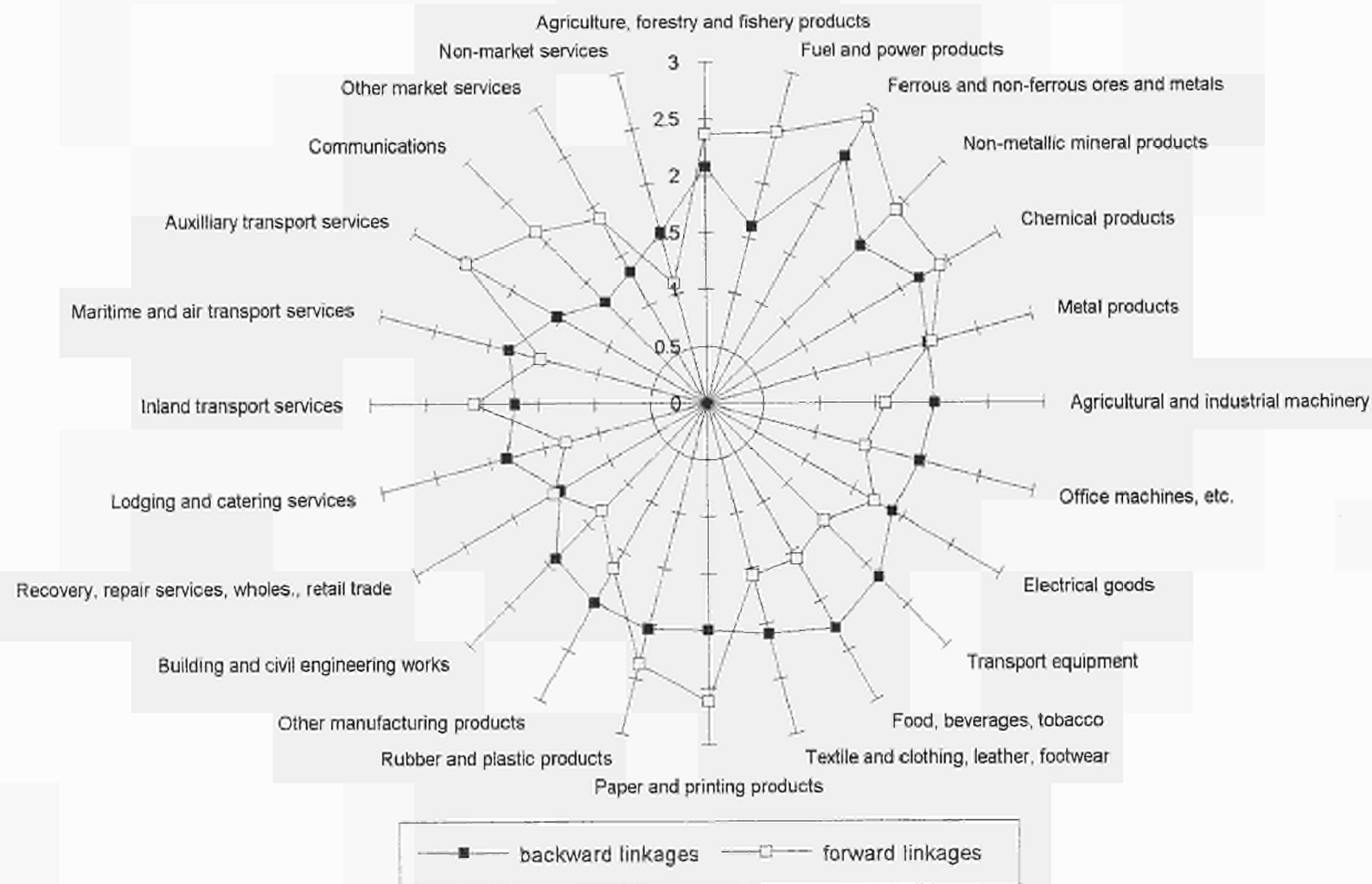
Forward and backward linkages of a production variation by branch to the total economy, coefficients for the European Union in 1991								
	direct backward linkages	rank	direct and indirect backward linkages	rank	direct forward linkages	rank	direct and indirect forward linkages	rank
Agriculture, forestry and fishery products	0.5388	8	2.0778	6	0.7903	3	2.3731	7
Fuel and power products	0.3674	19	1.6041	19	0.6906	7	2.4684	3
Ferrous and non-ferrous ores and metals	0.7130	1	2.5007	1	0.8322	2	2.8985	1
Non-metallic mineral products	0.5343	11	1.9536	13	0.8462	1	2.3996	6
Chemical products	0.6233	3	2.1934	3	0.6699	8	2.4121	5
Metal products	0.5208	13	2.0401	8	0.6370	9	2.0780	10
Agricultural and industrial machinery	0.5417	6	2.0294	9	0.3446	17	1.5902	15
Office machines, etc.	0.5387	9	1.9541	12	0.2894	20	1.4561	21
Electrical goods	0.4839	15	1.9040	15	0.4368	13	1.7175	13
Transport equipment	0.5964	4	2.1583	4	0.3182	18	1.4627	20
Food, beverages, tobacco	0.6426	2	2.2810	2	0.3457	16	1.5750	17
Textile and clothing, leather, footwear	0.5631	5	2.0932	5	0.3514	15	1.5621	18
Paper and printing products	0.5369	10	1.9953	11	0.7767	4	2.6163	2
Rubber and plastic products	0.5412	7	2.0549	7	0.7682	5	2.3653	8
Other manufacturing products	0.5340	12	2.0178	10	0.4230	14	1.6740	14
Building and civil engineering works	0.4971	14	1.9150	14	0.2065	22	1.3301	22
Recovery, repair serv., wholes., retail trade	0.3078	22	1.5178	22	0.3084	19	1.5769	16
Lodging and catering services	0.4395	17	1.8461	16	0.1675	23	1.3031	23
Inland transport services	0.4150	18	1.7133	18	0.5793	11	2.0692	11
Maritime and air transport services	0.4805	16	1.8211	17	0.2789	21	1.5240	19
Auxiliary transport services	0.3145	21	1.5322	21	0.7552	6	2.4613	4
Communications	0.1617	24	1.2663	24	0.6195	10	2.1329	9
Other market services	0.2009	23	1.3410	23	0.4878	12	1.8824	12
Non-market services	0.3260	20	1.5583	20	0.0638	24	1.0920	24

Figure 1: Forward and backward linkages of a production increase by branch to the total economy of the European Union 1991



One can see that the industrial branches have clearly higher values than the services as regards the backward linkages, and this applies to both direct and indirect aspects. This basic pattern applies to the forward effects too, but they are less pronounced. As regards the order of branches between direct and overall effects, this is virtually the same as far as the backward linkages are concerned, but it often varies with the forward ones. In addition, one can see that the indirect effects are usually multiples of the direct, sometimes as much as five times higher.

The intensity of the forward effects has a far larger scatter amongst the branches than in respect of the backward linkages. The minimum/maximum relationships are 1:4.4 and 1:2 respectively with direct/indirect backward linkages. The ratios of downstream effects are 1:13 and 1:2.7 respectively. For major branches such as chemicals, metals, electrical goods and transport equipment, the differences are less pronounced, particularly in respect of rear linkages.

Figure 1 gives the characteristic profile of effects over each of the branches. In those branches which are mainly the producers of raw materials, the forward effects are above the rear ones whereas it is usually the converse in industries providing final products.

In the case of the services, restaurants and catering, maritime and air transport and non-market services there are stronger backward than forward linkages. In the remaining service branches, the forward effects - sometimes strongly - dominate.

The effects we have just described include those arising through linkages within the branch in question. If these deliveries are excluded, corresponding to the deletion of the diagonal within the intermediate consumption matrix, only the effects on the other branches remain.

If all effects (forward and backward, direct and indirect) are combined, the overall effects are those given in Table 3. In the second column, only the **cross-branch effects** are shown whereas the first also includes within-branch linkages.

The strongest overall effect is to be found in ferrous and non-ferrous ores; if demand picks up in this sector, every increase in production of ECU 1 000 million would amount to ECU 2.5 thousand million on the input side and ECU 2.9 thousand million on the output side of all branches. In the case of services, inland transport would have the most powerful overall effects with 1.7 and 2.1 and auxiliary transport services with 1.5 and 2.5.


Particularly important overall effects would also be seen in the chemical industry, agriculture, forestry and fishery, paper and printing products, rubber and plastics, non-metallic minerals and metal products.

The effects, for the economy of the European Union, of increased production in machinery, office machinery and computers, electrical goods and transport equipment are far lower.

Without the intra-effects, however, the picture looks very different. Measured by the minimum/maximum relationship, the scatter of the values at around 1:4 is almost twice as great as when internal branch effects are included. The latter have the lowest scatter range at around 1:1.15 and are generally more homogenous.

It is thus the linkages with other branches which make up the clear differences in the total effects, whereby the service branches clearly gain some ground over the industrial ones. The raw material industries remain those branches with particularly strong effects but manufacturing industry becomes less pronounced, as far as the cross-branch effects are concerned.

Table 3

Total linkage effects of a production variation by branch on the total economy of the European Union 1991, with and without intra-branch effects				
 eurostat	intra-branch effects included	rank	intra-branch effects excluded	rank
Agriculture, forestry and fishery products	4.4509	4	1.9504	4
Fuel and power products	4.0725	8	1.4283	10
Ferrous and non-ferrous ores and metals	5.3992	1	2.1938	2
Non-metallic mineral products	4.3533	6	2.0333	3
Chemical products	4.6055	3	1.8356	7
Metal products	4.1181	7	1.8999	5
Agricultural and industrial machinery	3.6196	16	1.3197	15
Office machines, etc.	3.4102	17	1.2527	17
Electrical goods	3.6215	14	1.3526	13
Transport equipment	3.6210	15	1.2619	16
Food, beverages, tobacco	3.8559	10	1.3893	11
Textile and clothing, leather, footwear	3.6552	13	0.9686	23
Paper and printing products	4.6116	2	1.8281	8
Rubber and plastic products	4.4202	5	2.2433	1
Other manufacturing products	3.6918	12	1.3380	14
Building and civil engineering works	3.2451	20	1.1053	20
Recovery, repair services, wholesale and retail trade	3.0948	23	1.0255	21
Lodging and catering services	3.1493	22	1.1350	19
Inland transport services	3.7825	11	1.7330	9
Maritime and air transport services	3.3451	19	1.2208	18
Auxiliary transport services	3.9935	9	1.8399	6
Communications	3.3992	18	1.3586	12
Other market services	3.2234	21	1.0161	22
Non-market services	2.6503	24	0.5709	24

The proportion of external branch influences on overall effects is particularly high for rubber and plastic products (51%), non-metallic mineral products (47%), metal products and inland transport services together with auxiliary transport services (46% each). The proportion is low in the case of non-market services (22%) and textiles, footwear and clothing at 26%. The proportions vary between 32% and 45% for the other branches.

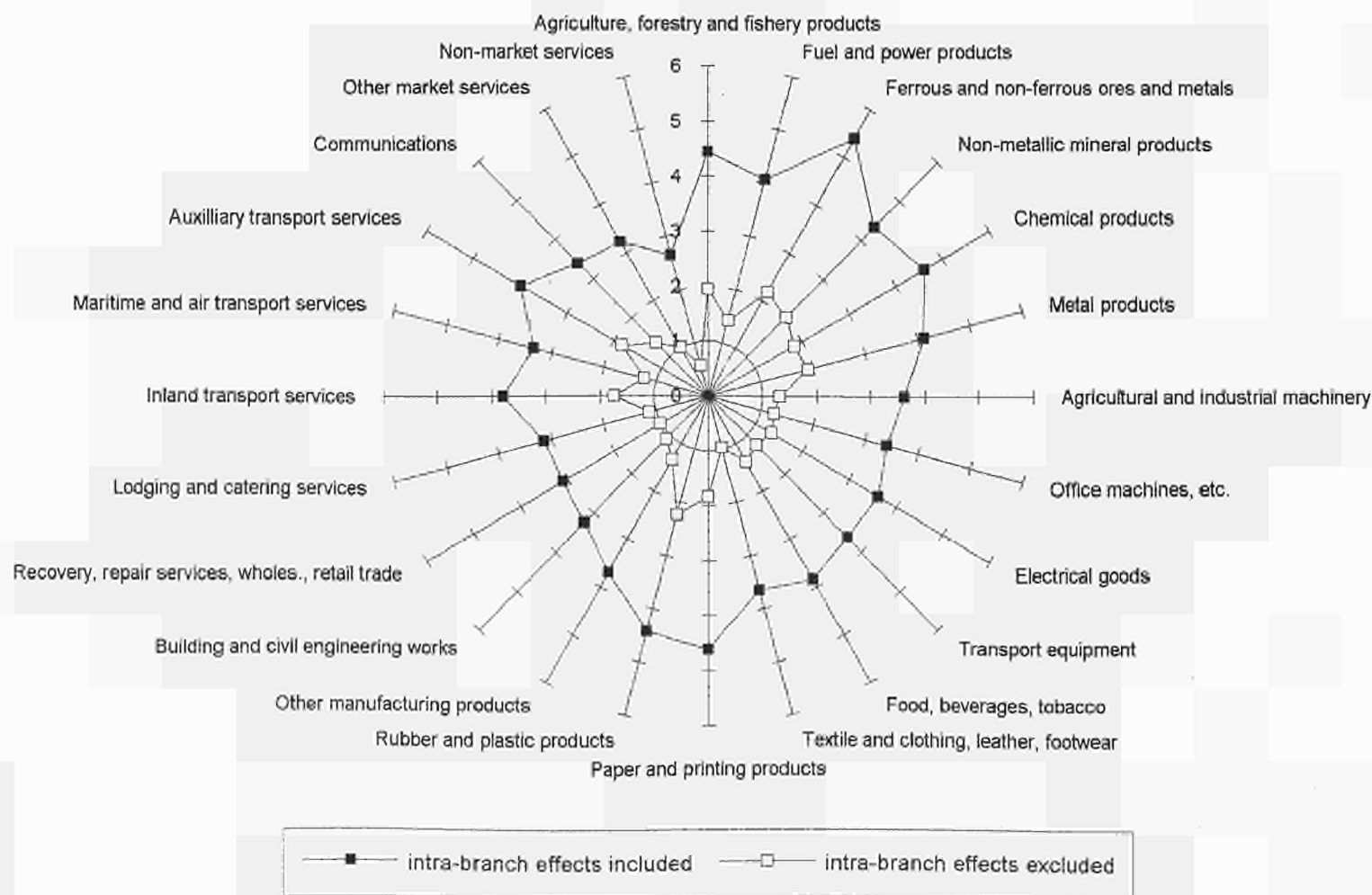
Diagram 2 shows the profile of the external branch and the overall effects. It is clear that the branches which have particularly high overall effects are

normally those having high values outside themselves.

This applies in particular, apart from the raw materials industries, to paper and printing products, rubber and plastics and to inland transport services and auxiliary transport services.

Taken as a whole, the structure of the overall effects for services is remarkably close to the pattern of the branch external effects whereas there are sometimes considerable differences for the industrial branches.

Figure 2: Total linkage effects of a production increase by branch on the total economy of the European Union 1991, with and without intra-branch effects



Stock of Input-Output Tables at Eurostat

As part of its five-year programmes, Eurostat has been producing harmonized national Input-Output Tables since 1959 which are based on the European System of Integrated Economic Accounts (ESA).

The series of national tables available (producer and/or ex-factory prices), which also contain detailed information on intra-Union trade, covers the years 1959, 1965, 1970, 1975, 1980 and 1985. In general, these tables are subdivided into at least 44 producer branches; depending on year and Member State, however, a more detailed breakdown of up to 59 branches is possible.

Comprehensive Input-Output Tables have been produced for 1985 and 1991 for the European Union, there being 25 aggregated production branches covering all Member States. These can also be used for comparisons with the USA and Japan.

In addition, it is planned, on a step-by-step basis, to integrate important basic statistics such as employment, capital, energy and pollutant emission into the Eurostat Input-Output information system by means of satellite systems.

For further information on the availability of input-output data, please contact:

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Methodological aspects

Although the time period for producing the Input-Output Tables (IOT) has been reduced in the Member States, the complexity and considerable requirements of the input material still lead to a certain delay. To permit reasonably up-to-date analysis by means of the IOT, Eurostat is now producing projections using a new methodology - developed by Prof. Beutel (University of Constance) - based on the EURO procedure.

This method prevents arbitrary changes in important input coefficients which occasionally occur with the most common RAS method, and a few shortcomings of projection methods such as MODOP, LPM or the Statistical Correction Method. EURO includes all the elements of the IOT and thus all the quadrants in an activity analysis approach. The column vectors are taken as base activities and subjected to a standard procedure.

The underlying idea of EURO is to use official Eurostat statistics for the EU as an exogeneous basis for iteration. The row and column vectors for intermediate uses and final demand are derived as endogeneous variables instead of taking them over as exogeneous variables from unspecified sources.

The main advantages of EURO are: robust projections, limited requirements of the input data material, integrated projection of all four quadrants, no arbitrary changes in the input coefficients, row and column vector of intermediate parameters are a component of the result, estimate of final demand by means of an iterative procedure and consistency of the supply and demand aspects.

The simple structure of the EURO procedure and the theoretical assumptions on which it is based does, however, bring disadvantages. One limitation is that the structure of final demand cannot be determined with econometric functions. In addition, the effects of relative price changes and other influences such as technical progress and productivity are reflected in an incomplete manner. In an econometric model, intermediate consumption would be derived from a cost minimization approach.

As the main goal of the IOT projected by EURO is to close the considerable gap between the five-yearly harmonized IOT, at least in part, the existing methodological deficiencies must be accepted in order to update national tables by means of the latest ESA results available. The projection would then be in an acceptable time frame.